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Conference Abstract

Combining Camera Trap Data and Environmental Data to Estimate the Effects of Environmental Gradients on Abundance of the Asian Elephant *Elephas maximus* in Cambodia

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Abstract

Asian elephant (*Elephas maximus*) populations in Cambodia are currently declining, and the effect of environmental degradation on the abundance and health of elephants is poorly understood. We used camera trap data from 42 locations between 2016 to 2020 in the southern Cardamom Mountains to investigate the impact of environmental degradation on the abundance and condition of Asian elephants. Camera trap data were organized using CameraSweet software to retrieve both number of individuals and their condition. For a number of individuals, we defined independent captures spatially and temporally. To assess condition, we created a visual scoring system based on past research (Wemmer et al. 2006, Fernando et al. 2009, Morfeld et al. 2014, Wijeyamohan et al. 2014, Morfeld et al. 2016, Schiffmann et al. 2020). This scoring system relies on visual assessment of the muscle and fat in relation to the pelvis, ribs, and back bone. To validate this subjective scoring system, two scorers reviewed elephant captures by using 10 reference photos and then reviewing each other's assessment in the first five images showing the elephant's body condition. This method minimizes subjective assessment from two scorers. Environmental variables (Suppl. material 1) such as distance to forest edge, forest integrity index, elevation, global human settlements, distance to road, distance to river, night light

and forest cover were obtained, then reclassified in ArcGIS to a common 1 km grid. We implemented hierarchical N-mixture models to investigate the impacts of environmental variables on abundance and used cumulative link models to investigate the impact of the same environmental variables on condition. We found that Asian elephant abundance exhibited a significant positive relationship with distance to forest edges, where abundance was greater further away from a forest edge. We found that body condition score exhibited the relationship with forest cover and Forest Landscape Integrity Index, which suggested that grassland and less dense forest support better condition. Moreover, males exhibited significantly higher scores for body condition than females, while babies, juveniles, and subadults all exhibited lower body condition scores compared to adults. The significantly lower body condition of young elephants is concerning and suggests that conservation managers in the region should prioritize environmental conditions that support young elephant health. Our results identify key environmental variables that appear to promote Asian elephant abundance and health in the Cardamom Mountains, thus informing relevant conservation actions to support this endangered species in Cambodia and beyond.

Keywords

Asian elephant, camera trap data, forest edge

Presenting author

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Conflicts of interest

The authors have declared that no competing interests exist.

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Supplementary material

Suppl. material 1: Environmental Variables Used in the study doi

Authors: Ret Thaung, Zachary Amir, Matthew Luskin
Data type: spatial data
Brief description: source of environmental variables that we used to assess effect on Asian Elephant abundance and condition in the Cardamom Mountains, Cambodia.
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